KING COUNTY CONVEYANCE SYSTEM IMPROVEMENT PROJECT

NORTH LAKE WASHINGTON PLANNING AREA

TASK 230 REPORT

EXISTING CONDITIONS

JANUARY 2004

HDR

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INTRODUCTION

The purpose of this Task 230 report is to characterize the physical and natural environment, known as sensitive areas, and the general natural resources located in the North Lake Washington Planning Area. This planning and project identification effort includes descriptions of the geological, biological, and other environmentally sensitive conditions in the planning area that may affect the construction of conveyance systems to extend current service capabilities. Current and future land use and growth conditions are also briefly identified. Information used to prepare this section includes relevant data from the U.S. Department of Agriculture, King County, Snohomish County, and Puget Sound Regional Council.

NATURAL ENVIRONMENT

King County and Snohomish County require protection of the natural environment and public health and safety in their respective areas through their Environmental Sensitive Areas regulations (KCC 21A-24 and SCC 30.62). The sensitive areas regulations contain development standards regarding wetlands; streams; erosion, flood, and seismic hazards; and other environmentally sensitive areas. Local jurisdictions within the counties are also required to develop and implement sensitive areas ordinances within their municipal boundaries. Any conveyance system construction must comply with the requirements of these regulations and ordinances. Sensitive areas and other natural resources in the North Lake Washington Planning Area are discussed in the following sections.

GEOLOGICAL FEATURES

Topography and Soils

The North Lake Washington Planning Area extends from Silver Lake in the north to the Sammamish River in the south. The western border roughly coincides with the western edge of the Swamp Creek Drainage Basin. The planning area extends east to the Woodinville Urban Growth Area (UGA) boundary in King County and to the Maltby UGA boundary in Snohomish County. The region is primarily a series of hilly plateaus with north-trending ridges separating the drainage basins. The elevations within the area range from 14 feet above mean sea level (MSL) at the Sammamish River to 560 feet MSL near Stickney Lake. The flood plains along the lower reaches of the Swamp Creek and North Creek are the only places in the study area that are below 100 feet MSL.

The surficial geology of the area consists almost exclusively of Vashon Drift glacial materials with till covering the top of the hills with recessional and advance outwash deposits

exposed on hillsides and in the vicinity of creeks. In terms of engineering, soils in the planning area are predominantly Alderwood series soils (U.S. Department of Agriculture, 1973; U.S. Department of Agriculture, 1983). These soils are comprised of a gravelly, sandy loam that usually have sufficient surface drainage. Ponding can occur at the soil surface after rains during the wet weather season. Erosion problems can be severe during heavy precipitation events. The soil in the Cross Valley Service Basin consists primarily of Everett series soils. Similar to Alderwood soils, this soil type tends to drain more rapidly due to the greater percentages of coarse gravel and sand in its composition. There are a few peat bogs interspersed throughout the planning area including ones near Thomas Lake near the northern end of the drainage basin Lake Pleasant just north of Bothell. There is also a significant expanse of peat beneath the alluvial deposits at the south end the North Creek and Swamp Creek drainages.

An extensive geotechnical investigation was conducted as part of King County's Brightwater Regional Wastewater Treatment System ("Brightwater") project. This investigation included the North Lake Washington Planning Area south of 228th Ave SE in the North Creek – Snohomish and Swamp Creek – Snohomish Service Basins. Refer to Chapter 4 of the Brightwater Final Environmental Impact Statement (EIS) for additional topographical and soil data.

Erosion Hazards

The susceptibility of any soil type to erode is dependent on the physical-chemical characteristics of the soil, the vegetative cover, the length and gradient of the slope, rainfall intensity, and the velocity of the surface water runoff.

Activities associated with clearing, grading, and construction of any new conveyance trunk, and their associated diversion structures and pump stations, can potentially contribute to erosion and sedimentation in these areas. Proper erosion and sedimentation control measures should be implemented during construction to minimize land disturbance impacts. Following construction, the land should be stabilized and revegetated, and proper drainage systems installed to minimize future erosion and sedimentation related problems.

There are few regions in the King County portion of the North Lake Washington Planning Area that have this classification, with the largest areas located east of Swamp Creek and Little Bear Creek (King County, 2003b). Figure 230-1 shows the erosion hazards areas in King County. Snohomish County does not specifically identify areas as erosion hazards. Instead, the potential for soil erosion is included in the definition of landslide hazards areas. More information regarding Snohomish County landslide areas are discussed below.

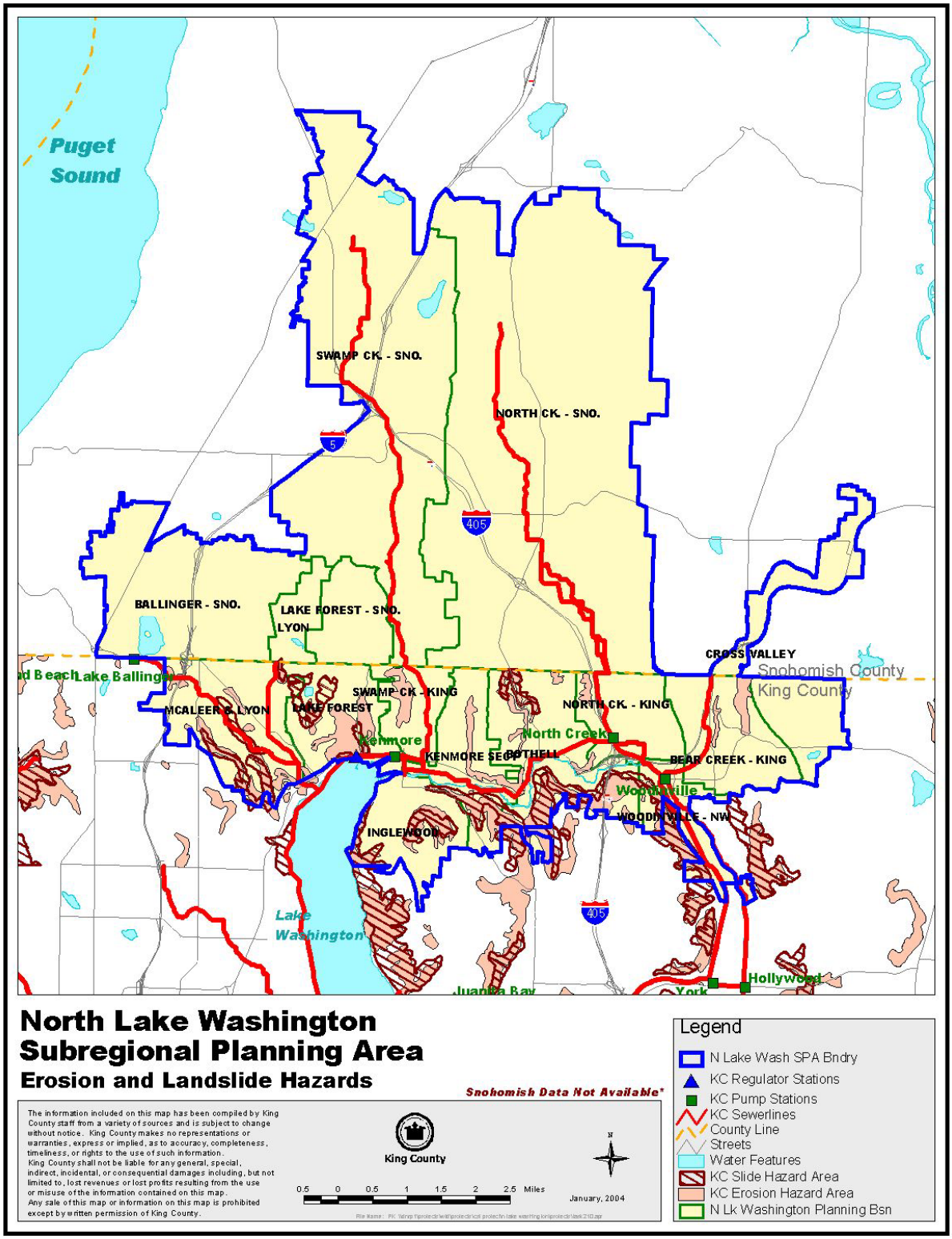

Figure 230-1. Erosion and Landslide Hazards in the North Lake Washington Planning Area

Landslide Hazards

Areas in King County designated as landslide hazards have slopes greater than fifteen percent, impermeable soils, and groundwater seepage or areas with slopes greater than 40 percent, regardless of soil and groundwater conditions (King County Code 21A-24). Landslide hazard areas are also places that have a history of rapid stream incision, stream bank erosion, or undercutting by wave action, as well as regions with a geological history of landslide susceptibility. There are few landslide hazard areas in King County that lay within the North Lake Washington Planning Area (Figure 230-1). All of these regions have also been classified as erosion hazards (King County, 2003b).

Snohomish County identifies landslide hazards areas in a similar manner as King County but further classifies the areas as function of their potential to have landslides. The classifications (moderate, high, and very high) are based on specific soil type, erosion potential, and known history of landslides. A review of hazard maps show numerous moderate and high landslide hazard areas in the regions adjacent to Swamp and North Creeks, but no very high hazard areas in the entire North Lake Washington Planning Area within Snohomish County. Additional maps showing landslide hazard areas in Snohomish County are located in Chapter 4 of the Brightwater Final EIS.

Seismic Hazards

Seismic hazards areas are prone to earthquake damage caused by settlement or soil liquefaction. Such areas occur when the soil has low cohesion and density, and when the groundwater table is near the surface. Large areas in the lower reaches of Swamp Creek and the entire portion of Little Bear Creek in King County are prone to seismic damages. Figure 230-2 shows the seismic hazards areas in King County. Snohomish County did not identify any seismic hazard areas in the area of interest. As with the topographical and landslide data, Chapter 4 of the Brightwater Final EIS also provides additional detail regarding seismic hazards in the region of the North Lake Washington Planning Area south of 228th Avenue SE in Snohomish County.

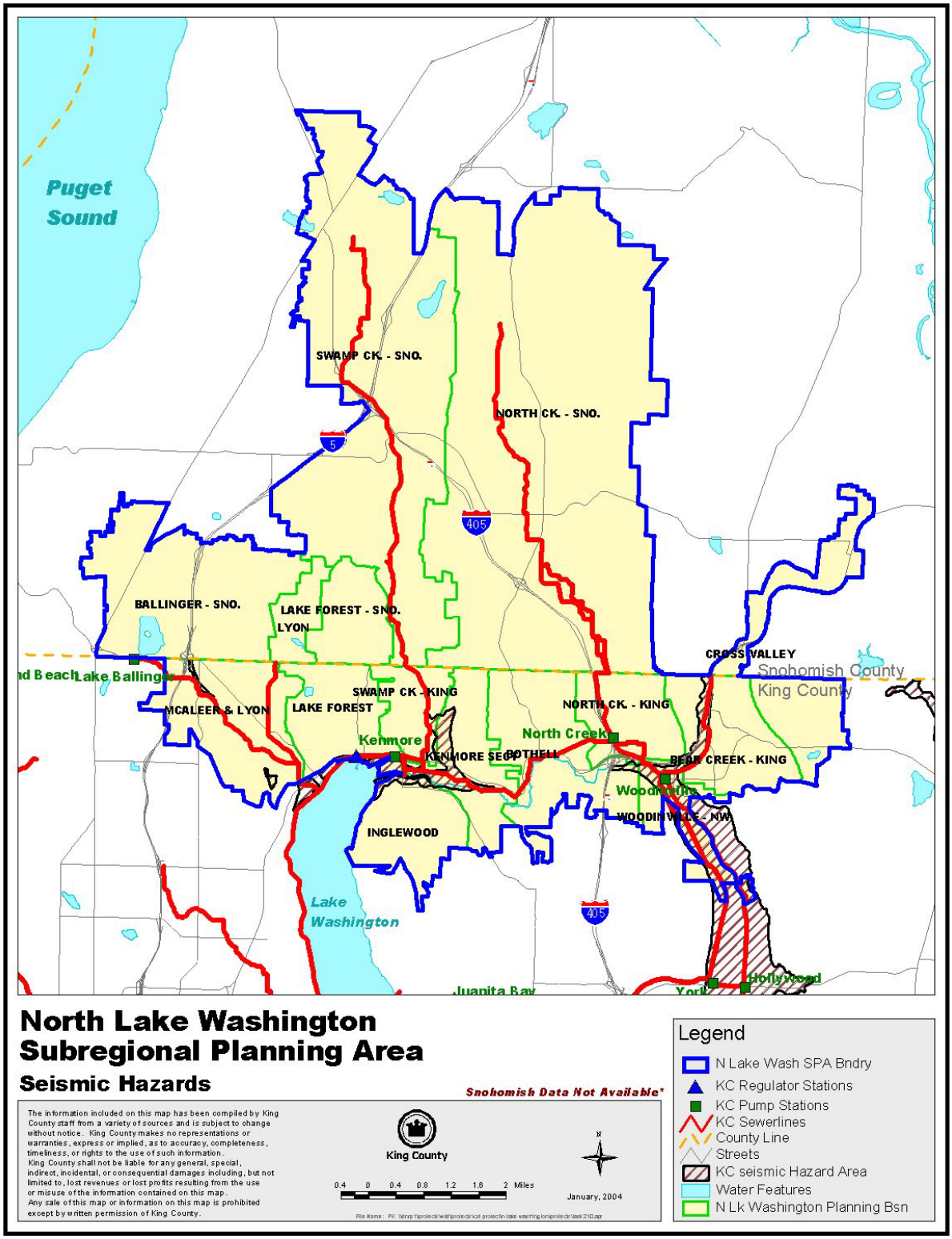

Figure 230-2. Seismic Hazards in the North Lake Washington Planning Area

Hazardous Materials

A review of the most recent Washington State Department of Ecology Hazardous Sites List indicates that there are eight locations in this planning area that have been confirmed as being contaminated with hazardous waste and are currently awaiting site remediation or being remediated. Table 230-3 lists the sites in the area and their clean-up status.

In addition to these sites, several businesses in the project area, such as service stations, manufacturers, paint supply centers, etc., are likely to use and store hazardous materials. The materials may leak into the ground and contaminate the site.

Table 230-1. Hazardous Sites in the North Lake Washington Planning Area

Site Name	County	Nearest City	Rank[(1)]	Status[(2)]
Able Pest Control	King	Kenmore	2	Construction Complete
BP Station 11352	King	Bothell	3	RA in Progress
Johnny's Wrecking Yard	King	Woodinville	3	Awaiting RA
Kenmore Industrial Park	King	Kenmore	1	RA in Progress
Universal Manufacturing Corp.	King	Woodinville	3	Independent RA
Arrow Metals Corp.	Snohomish	Woodinville	4	Awaiting RA
Wellington Hills Association	Snohomish	Woodinville	2	Independent RA
Woody's Auto Wrecking Inc.	Snohomish	Woodinville	5	Awaiting RA

(1) Values based on the Washington Ranking Method. A 1 indicates the highest public health risk, 5 the lowest.

(2) RA: remedial action

Source: Washington State Department of Ecology Hazardous Sites List, February 25, 2003.

WATER FEATURES

Sensitive Areas Regulation of Water Bodies

The main trunks of the Swamp and North Creeks in King County have been generally designated as Class 1 streams under King County Code 21A-24 (Environmentally Sensitive Areas), though the classification does vary by location. Little Bear Creek and the major tributaries of the Swamp and North Creeks have been generally designated as Class 2 streams with salmonid fish species present. Development within 100 feet of the streambanks

is generally prohibited or severely restricted. Snohomish County has designated the sections of the creeks in its jurisdiction with classifications, and development limitations, equivalent to that of King County's. Several tributaries in both counties exist but have not been classified yet. Any planned activity near these surface waters would require a stream classification prior to construction.

Drainage Basins and Streams

The North Lake Washington Planning Area encompasses the northern section of the Cedar-Sammamish watershed, containing the North Lake Washington, East Lake Washington, McAleer Creek, Lyon Creek, Swamp Creek, North Creek, Little Bear Creek, and Bear Creek drainage basins. All the basin headwaters, except East Lake Washington, are located in Snohomish County and drain southwards by their respective creeks to either Lake Washington or the Sammamish River in King County. The East Lake Washington begins in Bellevue and drains to Lake Washington from the east.

The King County Swamp Creek, North Creek, and McAleer/Lyon Service Basins approximate the outlines of the drainage basins with the same names. The Little Bear Creek drainage area includes the Cross Valley Service Basin. The North Lake Washington drainage basin approximate the boundary of the Lake Forest and Lake Forest – Snohomish Service Basins while the Inglewood Service Basin lies in both the Sammamish River and East Lake Washington drainage basins.

Wetlands

Wetlands are unique environments comprised of diverse terrestrial and semi-aquatic habitats. Biological habitat support refers to the wetland capacity for nesting, breeding, rearing, and feeding habitat for aquatic and terrestrial wildlife species. Wetland systems within the North Lake Washington Planning Area offer pockets of habitat for urban wildlife and wetland-dependent plant and animal species. The wetland size, water quality, diversity of habitat, and habitat structure affect its performance and function. All construction activities within wetlands and in established wetland buffers are restricted and require approvals and permit from the local jurisdictions and the U.S. Army Corp of Engineers.

Figure 230-3 shows the wetlands identified by King County. Location of most Snohomish County wetlands were determined by review of existing paper maps (Snohomish County, 2003) or by field assessments associated with the Brightwater project (King County, 2003b). Large wetlands are located on the western fork of upper Swamp Creek, approximately 1.5 miles north of Alderwood Mall, and on the lower reach of Swamp Creek, 0.5 miles from the confluence of Swamp Creek and Sammamish River. Smaller wetlands are to the immediate east and west of lower wetland, as well as on the north shore of Stickney Lake and at the confluence of two Swamp Creek tributaries.

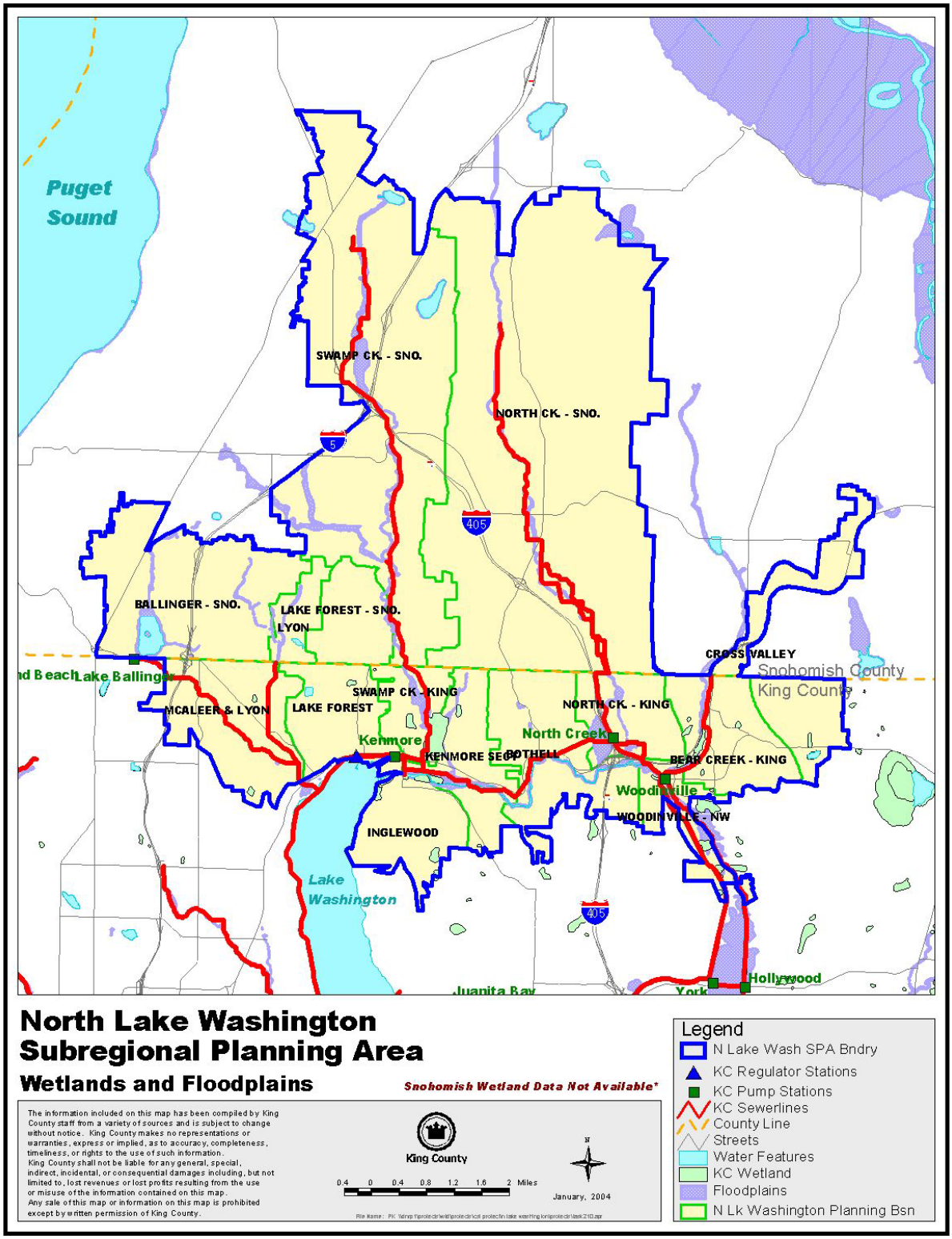

Figure 230-3. North Lake Washington Planning Area Wetlands and Floodplains

The headwaters of North Creek include a 15-mile long wetland that extends from the north limit of the North Creek – Snohomish Service Basin south through Mill Creek. The wetland varies from approximately 200 feet to 2 miles in width. Two large wetlands also exist within the Snohomish County portion of Bothell.

There is a narrow wetland along the lower Little Bear Creek. Three smaller wetlands are scattered throughout the Little Bear Creek drainage basin in King County. There appears to be no documented wetlands along the Snohomish County section of Little Bear Creek.

Floodplains

Floodplains are areas that have been calculated by the Federal Emergency Management Agency (FEMA) to be inundated by a 100-year flood, i.e. areas that have at least a one percent probability of being flooded for any given year. Streams, lakes, wetlands, and closed depressions all have floodplains that may be designated as flood hazard areas. Development in these areas is restricted or prohibited based on the type of flood area (i.e. flood fringe, zero-rise floodway, or FEMA floodway).

Figure 230-3 shows the location of the floodplains. Floodplains are located along all three major creeks in the study area. The Swamp Creek floodplain overlays the large wetlands located in the upper and lower reaches of the creek. North Creek's floodplain consists of a large area in the King County portion of the creek. It appears that the North Creek data for Snohomish County is missing since the floodplain abruptly ends at the King/Snohomish County Line. The narrow floodplain along the Little Bear Creek follows the entire length of the creek. Other floodplains in the North Lake Washington Planning Area include the western fork of Swamp Creek and along small lakes in the northern regions of the North Creek – Snohomish and Swamp Creek – Snohomish Service Basins.

Fish and Wildlife

The riparian areas of the creeks and streams in the area can provide essential wildlife corridors for the local and migratory fauna. However, the encroachment of urban areas, such as major arterial roadways, commercial shopping centers, industrial zones, and residential developments, has reduced the ecological value of the stream buffers. Also, some lengths of the streams have been artificially diverted or channeled through culverts, further limiting their ability to provide habitat to animals. The standard recommended Riparian Habitat Area (RHA) widths are summarized in Table 230-2. As previously mentioned, the three major creeks in the study area currently require that a minimum 100-foot riparian buffer. With the Endangered Species Act listing of Puget Sound chinook in the Puget Sound region, additional regulations have been proposed and promulgated to protect salmonid waters, bodies of water that have historically or currently provide salmonid habitat.

Table 230-2. WDFW Recommended Riparian Habitat Widths

Stream Type	Recommended RHA Width feet (meters)
Type 1 and 2 streams	250 (76)
Type 3 Streams; or other perennial or fish bearing streams 5-20 feet wide	200 (61)
Type 3 Streams; or other perennial or fish bearing streams less than 5 feet wide	150 (46)
Type 4 and 5 Streams; or intermittent streams and washes with low mass wasting* potential	150 (46)
Type 4 and 5 Streams; or intermittent streams and washes with high mass wasting* potential	225 (69)

* - Mass wasting is a general term for a variety of processes by which large masses of rock or earth material are moved downslope by gravity, either slowly or quickly.

Source: Washington State Department of Fish and Wildlife Management Recommendations for Washington's Priority Habitats: Riparian, 1997.

The Washington Department of Fish and Wildlife (WDFW) publishes a Priority Habitats and Species (PHS) list and a Species of Concern (SOC) list. The PHS List is a catalog of habitats and species considered to be priorities for conservation and management. Priority species require protective measures for their perpetuation due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority species include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable. There are approximately 140 vertebrate species, 30 invertebrate species, and 15 species groups on the PHS List (WDFW, 1999; amended 2003a). These constitute about 16 percent of Washington's approximately 1,000 vertebrate species and a fraction of the state's invertebrate fauna.

The SOC list published by the Wildlife Management Program includes only native Washington Fish and Wildlife species that are listed as Endangered, Threatened, or Sensitive, or as Candidates for these designations. Endangered, Threatened, and Sensitive species are legally established in Washington Administrative Codes. The latest version of the list is dated May 2003 (WDFW, 2003b). There are a number of wildlife species on the list, besides fish, that inhabit the North Lake Washington Planning Area. Any CSI projects in the area will need to coordinate with WDFW to determine potential impacts, if any, to species listed on either the PHS or SOC lists.

POPULATION GROWTH AND LAND USE

The Metropolitan King County Council and Snohomish County Council established urban growth areas in their respective 1994 and 1995 comprehensive plans and amendments. The plans requires future growth and development to be confined to the urban growth area to limit urban sprawl, enhance open space, protect rural areas, and provide for more efficient use of human services, transportation, and utilities. The wastewater conveyance and treatment systems in the counties were identified as one of the utilities whose capacity must match future projected growth. Every local wastewater agency in the counties have developed and adopted sewer plans in accordance to the King County and Snohomish County plans.

The Puget Sound Regional Council (PSRC) prepares long-range population, household, and employment forecasts for King, Kitsap, Pierce, and Snohomish counties. These forecasts are prepared to ensure a general consistency with local comprehensive plans developed under Washington's Growth Management Act guidelines. The predictions on the local level were produced by taking the prediction of the whole Puget Sound region and then allocating these values among smaller geographic areas, called forecast analysis zones (FAZ) and traffic analysis zones (TAZ). FAZ and TAZ boundaries generally follow existing municipal or community planning boundaries.

Table 230-3 shows the 2000 estimated and 2020 forecasted populations in the FAZs that cover the North Lake Washington Planning Area. The data shows that the planning area will experience an overall growth of 48% in the next 20-year period, with majority of the population increase occurring in Snohomish County.

The land use pattern in the North Lake Washington Planning Area is mixed. All of the area in King County and most of the area in southern portions of the Swamp Creek – Snohomish and North Creek – Snohomish Service Basins are either incorporated or unincorporated urban areas. The majority of the incorporated areas is zoned residential, with some commercial and light industrial zones. The northwest corner of the Swamp Creek – Snohomish basin is a major commercial/industrial zone centered on the Alderwood Mall. The remainder of the two basins is zoned low-density residential. The Cross Valley basin is zoned as either urban commercial or urban industrial areas. Agricultural or forested land use is minimal in the North Lake Washington Planning Area.

Table 230-3. Current and Projected Populations in the North Lake Washington Planning Area

Service Basin	Residential 2000 Pop.	Residential 2050 Pop.	Percent Change
Lake Forest	7,722	9,511	23%
McAleer and Lyon	14,647	16,681	14%
Cross Valley	11,570	27,773	140%
North Creek – Snohomish	70,353	149,847	113%
Swamp Creek – Snohomish	44,977	100,204	123%
Lake Forest – Snohomish	5,523	10,943	98%
Lyon	2,857	5,561	95%
Swamp Creek – King	3,695	4,540	23%
Bothell	11,039	13,848	25%
Kenmore Sect. 5	4,500	8,466	88%
North Creek – King	3,504	6,013	72%
Bear Creek – King	6,401	14,508	127%
Woodinville East	4,194	9,590	129%
Woodinville	2,916	5,127	76%
Inglewood	6,566	8,016	22%
Lake Ballinger (Edmonds East)	32,195	48,833	52%
Total	235,528	447,280	90%

Source: Preliminary Working Draft Facilities Plan: Brightwater Regional Wastewater Treatment System. May 2003.

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King County. Final Environmental Impact Statement for the Brightwater Regional Wastewater Treatment System. November, 2003a.

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